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LLNL

FOREIGN TRIP REPORT

LLNL-AR-773572

DATE: May 6, 2019

SUBJECT: Report of Foreign Travel to Sydney, Australia

TO: Dr. Angela Chambers, USDOE Nuclear Criticality Safety Program Manager, National

Nuclear Security Administration, NA-511

FROM: Anthony J. Nelson, Nuclear Criticality Safety Engineer, Lawrence Livermore National

Laboratory

MEETING TITLES:

- 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference
- 25th International Symposium on Room-Temperature Semiconductor X-Ray & Gamma-Ray Detectors

MEETING LOCATIONS:

• International Convention Centre, Sydney Australia.

MEETING DATES:

November 10-17, 2018

ATTENDEES ON BEHALF OF NCSP:

Anthony Nelson

MEETING BENEFITS TO NCSP:

The 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) was held alongside the 25th International Symposium on Room-Temperature Semiconductor X-Ray & Gamma-Ray Detectors (RTSD), making it one of the largest conferences dedicated to radiation detection instrumentation. There were many dedicated tracks relevant to criticality safety with a specific emphasis on experimental tools and methods including:

• Computing, Software and Simulations for Experiments

- Data Acquisition, Trigger and Front End Electronics Systems
- Gaseous Detectors
- Neutron Detectors and Instrumentation
- Nuclear Instrumentation and Measurement for Reactors and Related Applications
- Nuclear Physics Instrumentation
- Signal and image processing
- Spectroscopic detectors and systems
- Front-end electronics, signal digitization and processing
- Beam instrumentation
- New detectors developments
- Simulation, modeling and hybrid computing
- Semiconductor materials for radiation detectors
- Electronics
- Organic and other Photoconductive Materials for Radiation Detection
- Semiconductor Neutron Detectors

Radiation instrumentation companies from around the world sent vendors to this conference to highlight their product lines at the industrial exhibition. Meeting with these vendors in person proved to be very beneficial in two key ways:

- 1) The Reuter Stokes (RS) representative provided specifications for the detector that was used in the ISSA benchmark experiments. RS had previously been unwilling to provide this information when asked over the phone and through email.
- 2) A number of new neutron detectors were demonstrated that may be very useful for future experiments. In particular, RS has a ³He detector that is able to detect the axial position of neutron detection, allowing precise spatial information to be measured.

MEETING PURPOSE:

This meeting combined three separate but related conferences into one time and place in order to take advantage of the synergy between the different groups. The three conferences were the Nuclear Science Symposium (NSS), Medical Imaging Conference (MIC), and the 25th International Symposium on Room-Temperature Semiconductor Detectors (RTSD).

Nuclear Science Symposium (NSS)

The 2018 IEEE Nuclear Science Symposium is an annual international conference put on by the IEEE with the goal of providing the opportunity for scientists and engineers working in the field of radiation instrumentation to meet together, present new results and discuss the latest developments in their field, not only with their own colleagues, but also with colleagues from related fields such as medical imaging and room temperature semiconductors. The NSS program emphasizes the latest developments in detector technology, radiation detection, detector materials, new instrumentation techniques, and their implementation in high energy and nuclear physics, astrophysics, accelerators, national nuclear security, and many other applications in various types of radiation environments.

Medical Imaging Conference (MIC)

The IEEE Medical Imaging Conference (MIC) is the premier international forum for discussing the latest engineering, physics and mathematical developments in nuclear medical imaging. Medical imaging is a vibrant, constantly evolving field driven by emerging applications of radiation detectors in medical research

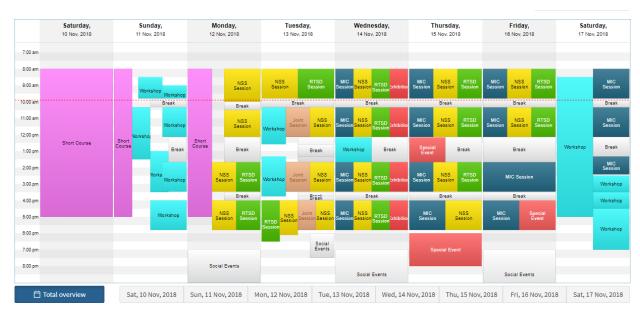
and clinical practice. Information from multiple, complementary imaging modalities is often combined to optimize diagnostic outcomes, motivating novel hardware and software solutions. Similarly, imaging techniques play an increasingly important role in planning, verification and adaptation of radiation therapy. It is in this context that medical imaging researchers and students from all corners of the world come together at the MIC to present their latest work, exchange ideas and establish new connections.

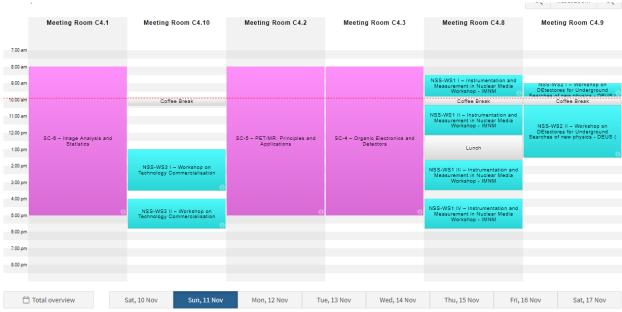
Symposium on Room-Temperature Semiconductor Detectors (RTSD)

The 25th International Symposium on Room-Temperature Semiconductor Detectors (RTSD) represents the largest forum of scientists and engineers developing new solid-state radiation detectors and imaging arrays. Room-temperature semiconductor radiation detectors are finding increasing applications in such diverse fields as medicine, homeland security, astrophysics and environmental remediation. The objective of this conference is to provide a forum for discussion of the state-of-the-art of the detector technology, including materials improvement, material and device characterizations, fabrication, electronics and applications.

The final program for the conference is attached.

CONFERENCE PROGRAM:





	Cockle Bay I	Cockle Bay II	Darling Harbour Theatre	Meeting Room C3.3	Meeting Room C3.6	Meeting Room C4.1	Meeting Room C4.2	Meeting Roon C4.3	Meeting Room C4.5	Park Side Ballroom
7:00 am										
8:00 am										
9:00 am			N-01 - NSS Plenary							
10:00 am			0							
11:00 am	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break				Coffee Break	Coffee Break
12:00 pm			N-02 - NSS Plenary			SC-9 - Medical				
1:00 pm	Lunch	Lunch	Lunch	Lunch	Lunch	Image Reconstruction: Theory and Practice	SC-8 - GATE, a GEANT4 Based Simulation Toolkit	SC-7 - Advanced Photodetectors	Lunch	Lunch
- 1						Theory and Fractice				
2:00 pm	N-03 - Photodetectors I	N-04 - Synchrotron and FEL Instrumentation I		N-05 - Creative Computing	N-06 - DAQ, Trigger and FEE I				R-01 – RTSD Opening	
3:00 pm	Coffee Break	Coffee Break	Coffee Break	Coffee Break	O Coffee Break				Coffee Break	Coffee Break
4:00 pm										
5:00 pm						0			R-02 – RTSD Pixel Detectors	N-07 – NSS Poste
6:00 pm										
7:00 pm										
8:00 pm	NSS Dinner	NSS Dinner								
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7:00 am										
8:00 am		N-08 - NSS F	N III				R-03 – RTSD	Detector		
9:00 am			0				Systen	ns O		
10:00 am	Coffee Break			fee Break			Coffee B	reak C	Coffee Break	
11:00 am	Instrumentation an Measurements for Reactors	d JS-01 - NSS-N Joint Ses	MIC-RTSD N-10 - N	luclear Physics Numentation S	I-11 — Astrophysics and Space Instrumentation I	N-12 – DAQ, Trigger a FEE II	and	MIC Techn	C-WS1 I – New ologies in Hadron rapy Workshop	
12:00 pm		0	0	0	0		0		i i	
1:00 pm	Lunch	Lunci	h	Lunch	Lunch	Lunch	Lunci	h	Lunch	
2:00 pm	N-13 – Analog & Dig Circuits I	ital JS-02 – NSS-	MIC Joint N-14 - Tr	Noting Software?	-15 – Radiation Damage Effects and Rad Hard			MIC Techn	C-WS1 II – New ologies in Hadron rapy Workshop	
3:00 pm		0	0	0	Devices (i)				rapy Workshop	
4:00 pm	Coffee Break	JS-03 – Hadro		fee Break	Coffee Break	Coffee Break	Coffee B	reak	Coffee Break	
5:00 pm		and microdosir Sessio	netry Joint N-16 -	Experimental Nomputing S	I-17 – Astrophysics and Space Instrumentation II	N-18 – DAQ, Trigger a FEE III	R-04 – RTSI Award + Cryst	D RTSD		
6:00 pm			U	0	0		0	0		
7:00 pm									EF	R - Exhibitor Reception
8:00 pm										

	Cockle Bay I	Cockie Bay II	Theatre		oom Meeting Room C3.3	Meeting Room C3.4&C3.5	Meeting Room C3.6	Meeting Room C4.4	Meeting Ro C4.5	oom Meeting Roo C4.8	om Park Side Ballroom
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:00 am	lasta manufation for		M 04 M	IIC.							
k:00 am	Instrumentation for Homeland and Nuclear Security I: Active Interrogation and	N-20 – Scintillator Materials I	M-01 – M Plenary I: Op Keynote Add and Hoffm Award	ening, dress nan		N-21 - High Energy Physics Instrumentation I				ExPr-I – Exhibi Presentation	tor R-05 – RTSD Poster Session
:00 am	Coffee Break	Coffee Break	Coffee Bre	eak	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Brea	ak Coffee Break	Coffee Break
:00 am			M-02 – M Plenary 2: Ke Address a Hasegawa Y	evnote					R-06 - RTS Material Characteriza	ExPr-II – Exhibi	itor N-22 – NSS Poster
00 pm			Investigator /	Award					Characteriza	0	0
:00 pm	Lunch	MLT – Machine Learning Tutorial	Lunch		Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
:00 pm	N-23 – Instrumentation for Homeland and	N-24 – Synchrotron and FEL			N-25 - Scintillation	N-26 - High Energy Physics			R-07 – RTS	D ExPr-III – Exhib	iter
00 pm	Nuclear Security II: Detectors	Instrumentation II			Detectors I	Instrumentation II			CdZnTe Detec	tors Presentation	0
:00 pm	Coffee Break	Coffee Break	Coffee Bre	eak	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Brea		Coffee Break
00 pm	N-27 - Neutron Detectors and Instrumentation I	M-04 – New radiation detector technologies 1			N-28 - Gaseous Detectors I - Developments	N-29 — Semiconductor Detectors I	N-30 - Scintillator Materials II	M-05 – Simulation and modelling of imaging systems	R-08 – RTS Perovskite Materials	ExPr-IV - Exhib Presentation	
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